International Disease Surveillance Conference – Meeting Synopsis

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14. ABSTRACT

In September 2011, the U.S. Pacific Command (USPACOM), the Armed Forces Health Surveillance Center (AFHSC) and the Center for Disaster and Humanitarian Assistance Medicine (CDHAM), in collaboration with the Maldives National Defense Force and the Maldives Ministry of Health hosted a three day International Disease Surveillance Conference in the Maldives. Both military and civilian public health experts from ten nations (Maldives, Bangladesh, Nepal, Indonesia, Laos, Sri Lanka, Thailand, Vietnam, China, and the United States) were in attendance. The conference provided an open forum to discuss country-specific disease surveillance goals, successes and challenges, and methods of collaboration to accomplish these goals. The objectives of the conference were to: a) Share methods for incorporating clinical, laboratory and pharmacy reporting elements into surveillance systems. b) Learn about methods for assessing the effectiveness of disease surveillance systems. c) Share social, cultural, and environmental considerations in surveillance methods.

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Background and Introduction

In many countries, including the United States, military forces engage in international disease surveillance, as military members and their families are often among those who are deployed or sent on missions to international locations. As militaries from around the globe frequent these international locations, both threats and opportunities arise for infectious disease surveillance and control.[1] Threats include introduction of a new infectious disease to a non-endemic region. For example, it is believed that U.S. troops were key players in the spread of the 1918 influenza pandemic during World War I.[2]

However, opportunities also arise when a military with significant resources can contribute to surveillance efforts of a resource-limited country with insufficient disease surveillance assets. The United States Department of Defense (DOD) takes a vested interest in disease surveillance across the globe through the Armed Forces Health Surveillance Center (AFHSC) and its Division of Global Emerging Infections Surveillance and Response System (GEIS). The AFHSC-GEIS partners with many countries around the world in building sustainable public health surveillance and laboratory capacities.[3] In addition to partnering with laboratories around the world, the AFHSC, in collaboration the geographic Combatant Commands (COCOMs), also works closely with partner nation militaries and ministries to conduct training workshops and exercises on important topics such as infectious disease surveillance.

In September 2011, the U.S. Pacific Command (USPACOM), the Armed Forces Health Surveillance Center (AFHSC) and the Center for Disaster and Humanitarian Assistance Medicine (CDHAM), in collaboration with the Maldives National Defense Force and the Maldives Ministry of Health hosted a three day International Disease Surveillance Conference in the Maldives. Both military and civilian public health experts from ten nations (Maldives, Bangladesh, Nepal, Indonesia, Laos, Sri Lanka, Thailand, Vietnam, China, and the United States) were in attendance. The conference provided an open forum to discuss country-specific disease surveillance goals, successes and challenges, and methods of collaboration to accomplish these goals. The objectives of the conference were to:

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Emerging Infectious Diseases of Concern for the Asia-Pacific Region

Chikungunya in the Maldives

COL Robert V. Gibbons from the Armed Forces Research Institute of Medical Sciences (AFRIMS), presented data on the first report of chikungunya in the Maldives.[4] Chikungunya is a

mosquito-borne virus, found in tropical regions, which is known to cause fever, arthralgias and arthritis, usually accompanied by conjunctivitis and rash. Prior to the outbreak of chikungunya, dengue was the only vector-borne virus confirmed in the Maldives.[5] Chikungunya is transmitted by the same mosquito vectors that transmit dengue virus (*Aedes aegypti* and *A. albopictus*) and the two viruses are often found co-circulating. In December 2006, the Department of Public Health in the Maldives added chikungunya fever to their list of reportable diseases.[4] According to the article published by the Maldives Ministry of Health,[4] from the first week of Decmeber 2006 until 28 April 2007, there were 11,879 reported suspect cases of chikungunya fever. The Department of Public Health collected blood from 67 of these patients. Through collaboration with the WHO Collaborating Center, the Armed Forces Research Institute of Medical Sciences (AFRIMS) Department of Virology in Bangkok, Thailand, they were able to test the sample for dengue and chikungunya virus. They found several patients were positive for chikungunya, some were positive for dengue only, and a few showed evidence of co-infection with both chikungunya and dengue. Chikungunya was reported from 121 (61%) of the 197 inhabited islands, and was absent from Faafu Atoll and the resort islands. This paper and the presentation by COL Gibbons illustrated not only how a disease previously unrecognized and non-endemic to the country emerged in the Maldives, but also the importance of collaboration in order to identify and control infectious disease outbreaks.

Nipah virus in Bangladesh

Lt Col Nurul Amin and Lt Col Mohammad Khalid Ayub from the Bangladesh Army gave a presentation on recent outbreaks of Nipah virus which have occurred in Bangladesh starting in 2001. Nipah virus, according to the WHO, is an emerging disease which causes "severe illness characterized by inflammation of the breain (encephalitis) or respiratory diseases."[6] It can be transmitted from animals to humans and from humans to humans. It was first recognized in humans during an outbreak in Malaysia in 1999.

In Bangladesh, the most likely source of infections is from consumption of raw date palm juice, which is contaminated with urine or saliva from infected fruit bats. Outbreaks are usually seen seasonally in Bangladesh, during the months of December-May. Since the first Bangladesh outbreak in 2001, there have been 11 Nipah-related outbreaks, involving 20 districts (Table 1). Routine Nipah virus surveillance started in 2006 in Bangladesh and is currently functioning in five district level government hospitals.

On February 1, 2011, a surveillance expert working at one of the five Nipah surveillance sites reported two cases with encephalitis. The following day three deaths of encephalitis cases were reported along with several more hospitalizations with similar symptoms from the same sub-district. A team was put together immediately to identify suspect and probable cases in the hospitals and larger community. Blood samples were collected from living suspect cases. A total of 20 Nipah encephalitis cases were identified in 5 adjacent villages, with 8 cases laboratory confirmed. One of the most alarming aspects of this virus is the high case fatalities rates witnessed, especially in this particular outbreak (Table 2).

2001	Meherpur	Caring or lining with a case	OR 7.9; 95% CI 2.2-27.7
2003	Naogaon	Close proximity with pig herds	OR 6.1; 95% CI 1.4-25.9
2004	Rajbari	Climbing trees	OR 8.2, 95% CI 1.25, +Inf
2004	Faridpur	Touching a Nipah patient	RR 15.0, 95% CI 4.0, 65
2005	Tangail	Drinking raw date palm juice	OR 7.0, 95% CI 1.6-31, P<0.01
2007	Thakurgaon	Remaining in the same room with Nipah patient	OR 57.0, 95% CI 4.4-7.44 P<0.001
2007	Kushtia	Person to person	P<0.05
2008	Manikganj and Rajbari	Drinking raw date palm juice	Adjusted OR 18, 95% CI 2.2-00, P<0.005
2010	Faridpur	Drinking raw date palm juice	Undefined
2011	Lalmonirhat	Drinking raw date palm juice	OR 17, 95% CI 4-70 P<0.001

Table 1. Cause of Nipah virus transmission

Clinical characteristics	n	%
Fever	20	100
Altered mental status	20	100
Unconsciousness	20	100
Headache	17	85
Difficulty breathing	14	70
Cough	14	70
Severe weakness	14	70
Drowsiness	14	70
Vomiting	11	55
Convulsion	10	50
Muscle pain	7	35
Joint pain	5	25
Outcome - Death	20	100

Table 2. Clinical characteristics of Nipah encephalitis cases in Hatibhandha, Lalmonirhat, January-February 2011.

Efficient, effective, timely and actionable disease surveillance systems are necessary for the South/southeast Asia region where diseases such as Nipah and Chikungunya are occurring. After each country gave brief presentations on their current disease surveillance capabilities, participants were divided into groups to discuss how to best improve disease surveillance efforts in their respective countries.

Disease Surveillance Systems in the Asia-Pacific Region

Groups were divided during the conference to discuss how they incorporate laboratory, clinical, and pharmacy data into their national disease surveillance systems. Another key topic of discussion was how countries manage the information gained in their various disease surveillance efforts. Several key issues arose during this discussion. One of the issues was lack of communication between military and civilian health surveillance systems. Although collaboration between military and civilian health is increasing in most of the countries represented, some still lack synergy in disease surveillance efforts. For example, in one of the countries, the chain for reporting in the military goes up from the regiment to the Ministry of Defense, the chain for reporting on the civilian side goes from the community health center to the Ministry of Health. Once the information reaches the top level, it is not formally shared between the Ministries. These same chains are used to pass information from the top levels down to the regiment/community level respectively.

The lack of communication on disease surveillance information continues into the public versus private hospitals. In many of the countries, accountability to WHO is not controlled in the private sector and many hospitals do not want to share disease surveillance information or participate in disease surveillance efforts of the country. One country in attendance mentioned that they are undergoing a large effort to integrate various information systems (both civilian and military) into one system for early warnings. The individual expressed that although it is seen in a positive light, it is going to be a very costly and labor-intensive process to integrate these independently functional systems into one larger system.

Another key issue in information management in the region is lack of web-based surveillance tools. In some countries where web-based surveillance is available, there is still continued parallel use of web and paper-based systems. In some areas, telephone-based reporting is used from local clinics to district level health facilities to then transmit through their paper-based system. In other rural areas, messengers carry reports across the country and it can take up to one week for the report to reach the district level. In many locations, reporting to the national level is done on a monthly basis; or information will be reported on a weekly basis but analyzed at the national level on a monthly basis. Without efficient, centralized methods for reporting, analysis of surveillance information is impossible to do in a timely fashion.

Integration of laboratory-based surveillance and hospital-based surveillance efforts is also a challenge in many of the countries in the region. At the forefront of this challenge exists the inherent need for building laboratory capacity in many of these countries. Lack of necessary equipment and training was a recurring theme in many of the countries. Additionally, countries in the region have varying topography, large and scattered rural populations, and can consist of many small islands. Many local rural labs rely upon national level reference laboratories to analyze results from collected laboratory specimens. Safe transport of these specimens to the

centralized national reference labs in varying conditions introduces another major challenge. Some countries reported receiving laboratory equipment without necessary training or reagents, in which case generously donated laboratory equipment becomes useless.

Conclusion and Way Forward

Through the information exchange at the International Disease Surveillance Conference in the Maldives, participants identified many gaps and lessons learned in their countries' disease surveillance systems. Lack of communication between ministries within and between countries on disease surveillance processes and outcomes was a recurring theme brought to the forefront during discussions. Many of the major players in disease surveillance in the military and civilian sectors of their respective countries met for the first time at this venue. By providing an initial forum for vital communication through this venue, it is our intent that the participants will continue the communication on their disease surveillance efforts and either begin to or continue working together towards addressing common goals. Formal partnerships are necessary for policy decisions and actions; this conference provided the initial informal interaction between ministries needed to foster these partnerships.

Integration of surveillance systems can be a costly and labor-intensive process. However, it is essential that the various systems within and between countries are able to communicate in order to effectively respond to an outbreak. This can be accomplished by use of common methodology, including similar case definitions, data collection and reporting methods, even when different systems are used to report. In addition to standardization of methods, electronic methods of reporting (versus paper-based) are crucial for timely and effective response and communication. As witnessed in the discussion, some countries are further along in the process of integrating their country's various surveillance systems than others. Partner countries shared indispensable insight with their neighbors so that they can begin to develop and implement their own strategies.

Convening various US government organizations that fund disease surveillance projects in the region with the people who are actively doing disease surveillance in the region, we intend to forge new relationships to continue to strengthen disease surveillance in the region. For example, a representative of the US Centers for Disease Control and Prevention (USCDC) stationed in China met members of the People's Liberation Army Institute of Disease Control and Prevention, and were able to exchange ideas and discuss the integration of military surveillance data with civilian surveillance data in China. This meeting represents one of the first where representatives from the Chinese People's Liberation Army were present, and is an example of how AFHSC strives to build military to military relationships with important partner nations through laboratory capacity building and strengthening disease surveillance systems worldwide.

Additionally, through the venue of this meeting in the Maldives, the AFHSC learned of a gap in education and training in Sri Lanka, where military medical education is in its infancy. AFHSC hopes to work towards filling this gap by partnering with the host country, USPACOM,

and the US Uniformed Services University (USU) to conduct a training workshop in FY13. The training workshop will focus on deployment health related issues, with particular concentration on pre-deployment health screenings, health surveillance and care during deployment and post-deployment health issues. The AFHSC, USU, and PACOM also hope to host a seminar for current military medical students and faculty at the General Sir John Kotelawala Defence University to discuss the curriculum of military medical education in the United States and share important advances and lessons learned.

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